THURSDAY, SEPTEMBER 15, 1870

THE MUSEUMS AND SCIENTIFIC INSTITUTIONS OF LIVERPOOL

FOR the third time since the founding of the British Association for the Advancement of Science, its annual meeting is being held in Liverpool. Those who, from former visits, are conversant with the town and its multitudinous attractions, will have every inducement to attract them thither once more; but as there are many who are paying Liverpool a visit for the first time, it may not be superfluous to direct special attention to those points which come more especially under the notice of all who are interested in scientific objects and pursuits, the more especially as during the meeting of the Association time is limited, or fully occupied during the chief portion of the day.

In Liverpool, then, first and foremost stands the Derby Free Public Museum, which is for once to belie its name by being closed to the general public during the meeting of the British Association, being only open to the members. As the reception-room occupies the central hall of this building, it will be of necessity much visited, and we have not the slightest doubt that its fine collections will be duly appreciated and admired. Visited yearly by upwards of half a million people of all classes it may be said without prejudice to other and much older country museums, to be the finest museum out of London. It took its rise in the zoological collection presented to the town by the late Earl of Derby some twenty years ago. The munificence and philanthropy of the late Sir William Brown induced him to erect the handsome building in which the Museum and Free Library are now placed, entirely at his own cost (about 35,000*l.*), on land given by the Corporation for that purpose. Since that time the museum has acquired by special gifts some extremely valuable and large collections, to be hereafter noticed more particularly, and is in daily receipt of specimens and contributions from its many admirers. Owing to the great maritime trade of Liverpool, the Museum is being constantly supplied with valuable specimens, collected by ships' officers and seamen all over the world; and as these gifts are acknowledged in the local papers each week, every inducement is held out for others to follow such good examples. The Museum, which is under the able curatorship of Mr. T. J. Moore, aims at being a Zoological Museum, and, moreover, essentially a practical and working one. For this purpose the specimens are arranged as far as possible in open table-cases, and proceed in order from the lowest animal forms, the Protozoa, through all the Invertebrata, to the Reptilia, Aves, and Mammalia.

Beginning in the room labelled Bird-room No. 1, the table-cases are filled with fine specimens of Protozoa, Corals, &c., and as the general arrangement in the cases throughout the Museum is pretty much the same, its completeness and perfection will be gathered if we describe one case more particularly in detail. We will take the large class of Spongida. In the centre of the case is placed a card about the size of a page of an octavo book, on which are legibly printed the chief characteristics, and an accurate description of the class of animals which are represented in the case. In the Spongida and many others, these descriptions are taken from Professor Huxley's work on the Classification of Animals. Around this card are arranged the mounted specimens, each accurately named and its locality given. British species are marked by distinctive labels, and the case is completed by the introduction of fossil specimens. Thus at a glance there is given an accurate description which can be soon copied out, and around it are placed the recent and fossil specimens of the class of object described. In short, upright, cases above these are arranged any more conspicuous and showy objects of the same class. The simplicity and thorough usefulness of the Museum may be easily imagined when it is understood that this system is pursued throughout, and that, in the large classes of Insecta and Crustacea, all the subclasses and distinctive genera are similarly treated.

Before leaving this room we cannot but notice a magnificent specimen of the rare coral *Isis Hippuris*, from Port Elizabeth (?), and the fine collection of the elegant Venus' flower-baskets (*Euplectella*), in reality a sponge, from the Philippine Islands. In Bird-room No. 2 we proceed, through the classes of Polyzoa and Molluscoida and Ascidia, to the Mollusca proper. There is a fine case of *Terebratulæ*, which deserves notice, as the recent specimens are very numerous, and are contrasted with good fossil specimens. A hasty glance showed us recent specimens from New Zealand, the Moluccas, China, Philippine Islands, South Australia, America, Sandwich Islands, Japan, Sicily, North Britain, Peru, Norway, Panama, Singapore, California, the Mediterranean, &c. &c., —surely not so bad for one case of rare shells in a local museum.

In the next rooms, Bird-rooms Nos. 3 and 4, the Bivalve shells are followed by the Gasteropoda and Cephalopoda, proceeding onward to the Crustacea and Insecta, of which there are—especially in the latter class—very fine and well-arranged collections. In the collection of Mollusca and Gasteropoda is incorporated a valuable typical collection presented to the Museum in December 1869 by Mr. S. Smith. All around the three rooms we have described are arranged large upright wall-cases filled with stuffed specimens, chiefly birds, whilst in Room 5 are arranged the collection of fish and reptilian remains. There is a fine skeleton of the Dodo, from Mauritius which was presented by Mr. Higginson, and is only excelled by the slightly more perfect ones in the British Museum and the Cambridge Anatomical Museum.

The collection of stuffed animal remains is arranged in the basement of the building, and is chiefly remarkable for the fine specimens of the Gorilla which are there exhibited. It is under process of re-arrangement, and so does not show to much advantage. The British collection is excessively poor, especially in birds, and there is every opportunity to any one who has a collection of British birds to present them to the Museum, where they will be much appreciated, and certainly properly utilised.

In a room below the basement is a small but almost unique collection, which we cannot but think will be largely visited this week. We allude to the collection of aquaria, where many of the rarest and most interesting marine and freshwater animals may be seen to great advantage. It is no slight advantage for the naturalist to study from living specimens the appearance and habits of such rare animals as the Axolotl from Mexico, and the Proteus from the caves of Adelsberg. In other aquaria are specimens of salamanders from Central Europe, the gigantic bull-frog of America, and many curious and rare American fish. There are also examples of the English lump fish, grey mullet, soles, flounders, shanny, and the rare blenny. The beautiful appearance of these fish, and their varied and in some cases gorgeous hues, cannot be imagined by those who have only seen the same fish when dead. There are also several fine tanks full of sea-anemones in very thriving condition.

We have now nearly exhausted the scientific portion of the Museum ; it only remains for us to notice the poor collection of geological specimens, which looks particularly bad just at present, as it is under process of arrangement. Still it is not much at the most, and is decidedly inferior in every way to the rest of the contents of the Museum. There is, however, a small case full of fine specimens of ferns and other carboniferous plants, collected by one of the local secretaries, the Rev. H. H. Higgins, from a railway cutting about eight miles from Liverpool. We hope to direct special attention to this new bed in another column, as it is within such easy distance of Liverpool, and the remains there found are so valuable and plentiful that all geologists attending the Association should pay it a visit.

Besides the above, there is still much to be seen in the Derby Museum, for in 1867 Mr. Joseph Mayer, a wealthy Liverpool citizen, presented to the town his exceedingly valuable collection of antiquities, coins, and gems. Its value is shown by the following extract from the report of the Library and Museum Committee :—" This collection, it is no exaggeration to say, is the finest of the kind ever presented to the public. In some of its departments, those of Wedgewood ware and ivory carvings, it is unique. It contains the best collection extant of illustrations of the Liverpool pottery ware, a manufacture for which the town was once celebrated, but which has long been extinct In Egyptian and Assyrian antiquities it is very rich, particularly in gems. The Fausset collection of Anglo-Saxon remains, the finest extant, forms a portion of it, together with a large number of ancient manuscripts and illuminations."

In recognition of this valuable gift a statue has been erected to Mr. Mayer in St. George's Hall. The collection is arranged in three tiers of galleries, round a wide open space in the centre of the Museum, and communicating with each other and the rest of the Museum. We cannot afford space to give any full description of this Museum, but its varied collections of antiquities, ancient armour, ancient weapons, musical instruments, coins, gems, watches, carvings, intaglios, Wedgewood and Majolica ware, rare MSS. and Mexican hieroglyphics, will all command crowds of visitors. In the upper gallery is placed *the Collection of the Lancashire and Cheshire Historic Society*, which holds its meetings in Liverpool, and a collection of valuable antiquities from the sea-coast between Leasowe and Hoylake in Cheshire, which belong to Mr. Ecroyd Smith and others, and concerning which Mr. A. Hume, of Liverpool, recently wrote a long and illustrated description in his "Ancient Meols"—the name of an old Anglo-Saxon and English settlement supposed to have been submerged by the sea.

The next place which will claim the most attention in Liverpool, after the Derby Museum, is the *Bidston Observatory*. This is reached by taking the ferry boat to Seacombe, and thence either omnibus or cab to the Observatory, about two miles distant. It stands in a fine situation, commanding most extensive views, and is about 200 feet above the level of the sea. Its great attraction, beside the fine equatorial telescope it contains, are its ingenious self-registering meteorological instruments. Of these the first to see is King's self-registering barometer, where, by means of an ingenious arrangement, the hourly movements of the barometer are self-recorded. There are only three such instruments in England—this one, one in Birmingham, and one in Mr. Crossley's private observatory in Yorkshire ; and they are stated to be superior to the ordinary photographic method employed elsewhere. In an upper part of the building is an instrument whereby, on the same sheet of paper, four different set of observations are self-registered. These are, the velocity of the wind, its pressure and its direction, and the amount of rain-fall. The instrument only requires to be attended to once a day, and then acts twenty-four hours without intermission. When we visited it on Saturday the pressure of the wind had reached as much as 65 lbs. per square foot, and its velocity at that time was about seventy-one miles per hour. The Observatory is open to all members of the Association on production of their tickets, and Mr. Hartnup, its director, will have great pleasure in showing and explaining all the instruments. We must not omit to notice a very ingenious and beautiful chronograph for recording transits by means of a most delicate piece of mechanism acting by electricity, and literally writing its own observations.

Returning to Liverpool, there are one or two more museums which deserve attention. The first of these is the *Museum of the Royal Institution*, in Colquitt-street. Before the opening of the Derby Museum, this was the principal museum in Liverpool, but it is now left comparatively in the shade. It is essentially a natural history museum, but the specimens are not well stuffed, and, together with the rooms, which are badly lighted up, have a very dingy and dirty appearance. There is, however, a fine collection of birds ranged round the walls of the two best rooms, the centre of which is occupied by a large collection of shells, neatly arranged and displayed, and well named, of which the chief specimens came from the collection presented to the museum by Mr. George Green, of Liverpool. The mineralogical collection, which wants re-arranging and classifying, has lately received large additions from the collection of the late Dr. James Stewart Trail, of Edinburgh, lately presented to it. There is a geological collection arranged round an upper gallery, but of which nothing commendable can be said. The materials are there for a good typical collection, and there are a few good American collections which are interesting ; but they all sadly want naming and properly arranging, localities given, &c.

Next to this is an Economic Museum, which is worth visiting, arranged somewhat on the system employed at South Kensington. Besides these, there is a herbarium, a fair collection of butterflies and beetles and a collection of fungi from the Liverpool district, and a good collection of zoophytes from Bootle, near Liverpool. There is also a small collection of ethnographical objects, weapons, Indian remains, flint axes, &c., and the usual miscellaneous objects of a local museum. There is a large stuffed specimen of the sea-elephant from the South Shetland Islands, which is valuable, as the species is yearly becoming much rarer. It seems a pity that some arrangement could not be made between the two museums, so that this one could be lightened of some of its heterogeneous contents, and more room given for a better display of some special collections. Besides this, those who are interested in mineralogy should not fail to visit the *Medical Institution*, in Hope-street, where Phillips's mineral collection is well exhibited. There is also the *Museum of the Royal Infirmary School of Medicine*, which is more likely to please those interested in medical pursuits than the general public.

To those botanically inclined, the extensive *Botanical Gardens in Edge Lane* will be very attractive. They cover an extent of about eleven or twelve acres, and are very tastefully laid out, and the large conservatories contain many fine and choice exotics.

Those who are interested in the practical application of science to the requirements of the present day, should not fail to visit *the Liverpool Sewage Utilisation Works at Sandhills.* These are open to all members of the Association, and will be found to afford much practical knowledge on a subject that is yearly attracting more attention.

The Liverpool scientific societies, though they have existed many years, have failed to attract very much attention, or to become prominently known. The most important of these is *the Lancashireand Cheshire Historic Society*, which was started about 1847, as a purely antiquarian society in all matters relating to the two counties. It has published a set of transactions containing much valuable information ; but of later years it has enlarged its scope and taken in other branches of scientific knowledge, with a result, we fear, not commensurate with the wishes of its promoters. *The Liverpool Philosophical Society*, and *the Liverpool Geological Society*, unlike the similar societies in Manchester and Leeds, are but little known outside the city in which they hold their meetings.

Soon after Owens College was founded in Manchester, a somewhat similar college, called *Queen's College*, was started in Liverpool; but whether owing to lack of energy or good management on the part of its directors, or from the overpowering influence of the old-established Collegiate Institution, it has certainly failed in approximating in any direction to the national importance and value that the former college has obtained.

In some degree compensating for these failures, Liverpool possesses a very extensive and much-patronised *Field Naturalists' Club*, which does a great deal by weekly excursions to infuse into its members a taste for natural science and out-of-door scientific work, and there is little doubt but that from all its members the British Association will receive a hearty welcome ; and let us hope that from this year's meeting may date an increased impetus to Science in the neighbourhood. J. P. E.

NOTES ON THE GEOLOGY OF THE COUNTRY AROUND LIVERPOOL

THE following brief notes on some of the points of geological interest may perhaps be of use to geologists from the South of England visiting the British Association's Meeting at Liverpool.

The tract of country lying between the rivers Dee and Mersey, known as the peninsula of Wirral, is composed of Triassic rocks, forming a series of undulating ridges and valleys, running parallel with the strike of the rocks. The average elevation of the crest of the hills is about 150 feet, and they, as well as the valleys, are more or less covered with glacial drifts. The northward prolongation of the hills and valleys is abruptly terminated by a broad plain, but little raised above the sea-level, which forms the seaward portion of the Hundred of Wirral. This plain, which is composed of peat partly covered with alluvium, is drained by the River Birket, which flows eastward along its whole length, from a little south of Hoylake, until it falls into Wallasey Pool, an arm of the River Mersey, which separates the tract of comparatively high land known as Wallasey (anciently an island) from the Triassic hills south of the Pool.

Crossing the Mersey, the town of Liverpool is found to rest on a continuation of the Triassic hills south of the river, but more deeply covered with drift, which has in most cases so entirely filled up the valleys that the whole of the Coal-measure and Triassic districts of south-west Lancashire are one vast plain, surrounding a central nucleus formed by the spurs of the Pennine Chain, composed of the Millstone Grit.

The latter formation, on the borders of the Lancashire coal-field, reaches an average thickness of 5,000 feet, and is composed of four great beds of grit, divided from each other by thick beds of shale. These beds are known as the *Rough Rock*, or first grit ; the *Haslingden Flags*, or second grit ; the third grit ; and the *Kinder Scout*, or fourth grit. The first and fourth grits are generally coarse, conglomerative, and massive ; the third, as a rule, finer and not conglomeratic—both it and the fourth grit are often divided into two, three, and even more beds of thick seams of shale, which thin, wedge out, and thicken in the most irregular and local manner. In fact, though the Millstone Grit, as a whole, maintains a general average thickness in any special area, its members in *detail* appear to be ever changing places in relative consequence with each other, proving the shallowness of the sea, the proximity of land, and the existence of currents laden with different materials, sand and pebbles washed from those deep-seated quartzites which raised their heads above the sea at the time of the deposition of the grit in the area now occupied by the Pennine Chain.* Workable coal-seams occur in the first and third grits, and thin seams in the fourth ; associated with them are shales in which a flora and fauna of about 30 species occur, the same species recurring in the different seams of shale : 18 species occur in the shales of the "Feather-edge" coal† (in the Rough Rock) ; amongst them are *Calamites Suckowii*, and *Pecopteris arborescens*. The former species I recently found in some shales of the second grit, exposed

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* Prof. E. Hull, F.R.S., Quart. Journ. Geol. Soc., August, 1868.

† This coal is described by Mr. E. W. Binney, F.R.S., in the Trans. Geol. Soc. Man. vol. i. ; by Prof. E. Hull, F.R.S., in Geol. Surv. Mem. "On the Geology of Oldham," and in the "Geology of Bolton-le-Moors."